# Phase I Report of the Defense Science Board Task Force

*on*

# Joint Experimentation

September 2003

Office of the Under Secretary of Defense
for Acquisition, Technology, and Logistics
Washington, D.C. 20301-3140

# Report Documentation Page

*Form Approved*
*OMB No. 0704-0188*

Public reporting burden for the collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to a penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number.

| 1. REPORT DATE | 2. REPORT TYPE | 3. DATES COVERED |
|---|---|---|
| **SEP 2003** | **N/A** | **-** |

| 4. TITLE AND SUBTITLE | 5a. CONTRACT NUMBER |
|---|---|
| **Phase 1 Report of the Defense Science Board Task Force on Joint Experimentation** | 5b. GRANT NUMBER |
| | 5c. PROGRAM ELEMENT NUMBER |
| 6. AUTHOR(S) | 5d. PROJECT NUMBER |
| | 5e. TASK NUMBER |
| | 5f. WORK UNIT NUMBER |
| 7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) **Office of the Undersecretary of Defense for Acquisition, Technology and Logistics Washington, DC 20301-3140** | 8. PERFORMING ORGANIZATION REPORT NUMBER |
| 9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES) | 10. SPONSOR/MONITOR'S ACRONYM(S) |
| | 11. SPONSOR/MONITOR'S REPORT NUMBER(S) |

12. DISTRIBUTION/AVAILABILITY STATEMENT
**Approved for public release, distribution unlimited**

13. SUPPLEMENTARY NOTES

14. ABSTRACT

15. SUBJECT TERMS

| 16. SECURITY CLASSIFICATION OF: | | | 17. LIMITATION OF ABSTRACT | 18. NUMBER OF PAGES | 19a. NAME OF RESPONSIBLE PERSON |
|---|---|---|---|---|---|
| a. REPORT | b. ABSTRACT | c. THIS PAGE | | | |
| **unclassified** | **unclassified** | **unclassified** | **UU** | **48** | |

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DEFENSE SCIENCE
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MEMORANDUM FOR ACTING UNDER SECRETARY OF DEFENSE
(ACQUISITION, TECHNOLOGY AND LOGISTICS)

SUBJECT: Phase I Report of the Defense Science Board (DSB) Task Force on Joint Experimentation

I am pleased to forward the Phase I report of the DSB Task Force on Joint Experimentation. At the initiation of the Commander, U.S. Joint Forces Command (JFCOM), the Defense Science Board was tasked to examine JFCOM's campaign plan for joint concept development and experimentation (CD&E) and review the results of the Millennium Challenge 02 (MC02) event.

In response, the attached report of the Task Force identifies the attributes necessary for a successful CD&E campaign, recommends steps to foster action from experimentation and offers observations on MC02's products.

I note that JFCOM is already moving in the direction recommended by the Task Force. One example is establishing closer working relationships with the Services and other commands. However, more needs to be done to realize joint experimentation's potential to be a powerful catalyst for transformation.

I endorse the Task Force findings and recommendations and propose that you review the Task Force Chairman's letter and report.

William Schneider, Jr.
Chairman

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DEFENSE SCIENCE
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MEMORANDUM FOR THE CHAIRMAN, DEFENSE SCIENCE BOARD

SUBJECT: Phase I Report of the Defense Science Board Task Force on Joint Experimentation

JFCOM has the lead responsibility in DoD for joint concept development and experimentation. It is no easy task.

Experimentation can be an unnatural act for established organizations. Outcomes are uncertain and may be threatening to many in the enterprise. Experimentation on military operations poses additional intellectual challenges — how to account for exceedingly complex situations, adaptive adversaries, and human behavior under extreme stress. Lastly, experimentation on joint operations adds yet another layer of difficultly because of the organizational interfaces involved and the relative immaturity of processes for prioritization and resource allocation of joint capabilities.

The DSB Task Force on Joint Experimentation reviewed Joint Force Command's campaign plan for joint concept development and experimentation. Based on that review, this Phase I Report of the Task Force identifies the attributes of an effective campaign.

Of particular importance is the need to reorient JFCOM's experimentation focus from inward (largely about inviting others to participate in JFCOM events) to external (largely about participating in and influencing Service and Combatant Command experiments and related activities). The first approach limits JFCOM potential as an agent for transforming U.S. military capabilities. The second offers enormous leverage. JFCOM is already moving toward a greater external orientation. Its co-sponsorship with the Army of the Unified Quest 03 Transformation Wargame this past spring is one example. This report also emphasizes the importance of support from the Secretary of Defense (SecDef) and the White House if joint experimentation is to foster new joint capabilities.

Other attributes detailed in the report include:

- Closer connections to real-world operations and lessons learned,
- More competition of ideas,
- More attention to tough military challenges posed by adaptive adversaries, and
- Smaller and more frequent experiments, more participants in the experimentation process (not necessarily in any single experiment), and more flexibility in the experimentation campaign.

The Task Force also recommends ways to deal with what may be the major obstacle: turning the results of experiments into action. Steps that JFCOM can take itself include:

- Emulating the approach it is inventing and using to gather and disseminate joint lessons learned from Operation Iraqi Freedom,
- Selecting participants for experiments based on their potential to serve as agents for change,
- Embedding implementation plans into the experimentation campaign plans and involving implementers in the experiments,
- Leveraging the connections its own J-7 has with the combatant commanders, and
- Establishing a closer relationship with the Joint Staff's J-8.

The Task Force further recommends that the SecDef provide the needed flexibility in funding to be able to rapidly exploit results of experiments and to take steps to bring Advanced Concept Technology Demonstrations (ACTDs) and experiments closer together to exploit their complementarities.

On behalf of the Task Force members, I express our appreciation for the effort and contributions of the government advisors; presenters from the JFCOM; MG Dean Cash USA (Ret.), Task Force Executive Secretary; LTC Scott Dolgoff from the DSB office; and Stacie Smith, the support staff lead.

Ted Gold, Chairman

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# Chapter 1. Introduction

The Defense Science Board (DSB) Task Force on Joint Experimentation was established to examine the joint experimentation programs and activities at the Joint Forces Command (JFCOM) and to recommend ways to enhance the contributions of joint experimentation to transformation. The Task Force assessed the goals, process, and substance of JFCOM's experimentation program. The Task Force also provided an external review of the Millennium Challenge 02 (MC02) experiment.

Specifically, the Task Force reviewed Joint Forces Command's campaign plan for joint concept development and experimentation (CD&E) in several sessions from November 2002 to March 2003. The plan was in a state of considerable flux during this period, for example, with some changes influenced perhaps by the interim reports the Task Force provided to the Commander JFCOM and the Director of JFCOM's Joint Experimentation Directorate (J9). Since the campaign plan has continued to evolve since the Task Force's exposure to it, this report does not attempt to provide a detailed evaluation. Instead, characteristics are described that would make a joint CD&E campaign an effective agent for transforming U.S. military capabilities. Observations about the results of MC02 event, based on brief presentations to the Task Force, are also offered.

The topic of this study, "joint experimentation," merits some elaboration. There are different views about what constitutes an experiment, and even the term "joint" generates multiple definitions.

What is experimentation? The subjects of JFCOM's experiments are future military operations. The complexity of military operations and the centrality of human behavior in such operations make it exceedingly difficult to achieve the control of variables associated, for example, with physical science experiments. Experiments about military operations and experiments on physical phenomena are similar in that their outcomes are uncertain. The operational concept being experimented on can be found wanting; however, the experiment fails only if nothing is learned.

What is "joint"? It is not merely operations involving two or more Services. From the perspective of transforming force capabilities, "joint" encompasses both the operational level of war (what joint force commanders plan and do) and the synergy derived from interdependence of capabilities that the Services provide. The recent campaigns in Afghanistan and Iraq demonstrated the operational-level power of such interdependence at the lowest tactical levels.

## Organization of This Report

Chapter 2 offers the Task Force perspective on desirable attributes of a joint experimentation campaign, presents criteria for the selection of experimentation topics, and suggests some candidate topics. An elaboration of the desired attributes is provided in Appendix A.

Chapter 3 then addresses ways to overcome a major obstacle—how to turn what is learned from experiments into actions.

Chapter 4 provides Task Force observations on the results of MC02, and Chapter 5 is a summary of Task Force recommendations.

The Terms of Reference is provided in Appendix B, and a list of the Task Force membership in Appendix C. A list of briefings and discussions heard by the Task Force, and a Glossary are provided in Appendix D and Appendix E, respectively.

# Chapter 2. Experimentation Campaign: Strategy and Focus

## Campaign attributes

The Task Force suggests the following as desirable, perhaps necessary, attributes of an effective experimentation campaign. Appendix A provides further elaboration.

### Having the support and involvement of the Secretary of Defense and other senior officials.

Experimentation can produce surprises and imply changes to existing plans and programs. It will be difficult for joint experimentation to serve as a catalyst for transforming the capabilities of U.S. armed forces unless the most senior government officials (up to and including the President) provide support and have a stake in the CD&E campaign. It is particularly important that findings and recommendations ensuing from joint experiments get attention from the Secretary of Defense and Chairman of the Joint Chiefs of Staff.

### Getting the front end right.

Getting it right means having a clear statement of purpose for the overall joint CD&E campaign that is ambitious in the mid to long term, aims to produce real capabilities in the short term, and has sufficient clarity to enable accountability. The campaign itself should focus on a very few aspects of joint warfighting. These should address either a widely recognized problem or provide a great opportunity for new transformational capabilities; otherwise, JFCOM will get little implementation help. JFCOM is already pursuing one such capability in its Standing Joint Force Headquarters (SJFHQ) effort. Suggestions for other candidates are offered later in this chapter. A small fraction of JFCOM's resources should be reserved for more speculative investments for which eager customers might not yet exist.

Get the front end right and good things happen. Useful metrics become more apparent, implementation paths more practical. The Task Force ex-

pressed concern that in the initial briefs received from JFCOM—the front end of the story—lacked clarity and focus. For example, the "Big Issues" chosen to drive the CD&E strategy were "Achieving Decision Superiority," "Creating Coherent Effects," and "Conducting and Supporting Distributed Operations." Task Force members believe that these are too abstract and too top level, making it more difficult to generate support for the campaign, to develop real expertise at JFCOM, and to make and gauge progress. Instead, the Task Force suggested selecting big issues that are more explicitly tied to specific joint warfighting challenges; we offer criteria for selecting such drivers. A later iteration of the campaign plan presented to the Task Force offered a considerably sharper statement of purpose and focused on specific joint warfighting issues.

### Having a strong external orientation.

JFCOM should direct most of its energy and resources outward and work more closely with the Services, Commands, and Agencies than it has in the past. The primary objective is not to draw them into JFCOM's activities but rather to influence what they are doing. The leverage across the Department and all the Services that JFCOM could have by operating in this manner is enormous. JFCOM should look for and exploit opportunities to make everything—training, exercises, Service games and experiments—into a learning experience about joint warfighting issues. The existing training and exercise infrastructure needs to be updated to be able to test emerging operational concepts. The use of surrogates, such as simulations and actual equipment, should be fostered. Doing all this effectively will require that JFCOM have control of substantial funds—not billions of dollars, but hundreds of millions of dollars per year—to disburse to others.

### Becoming an aggressive collector, analyzer, and disseminator of lessons and data in joint warfighting areas from real-world operations, exercises, and the like.

This effort will be labor intensive but should be a high priority. Joint Forces Command should be the repository of the data, documentation, and experts in the Armed Forces on the joint warfighting areas:—joint fires; air defense; joint command and control and networks; integration of joint fires and maneuver; and joint logistics. JFCOM does not have to do all the data collection itself. It can specify the joint issues that it wants captured from Service events

and have the Services collect the relevant data. This reinforces the need for funds.

### Embedding implementation planning—the next steps—into the experimentation campaign plan.

Rapid prototyping should be part of this implementation—but only a part. Even if the product is "only" insight, there should be a plan for the next steps—who can use the insight and how might it be used. Get those people who are in a position to facilitate implementation involved in the experiment as early as possible—do not wait until the experiment's final report is delivered.

### Not getting tied to a specific time target for the overall campaign.

The experimentation campaign needs to be guided by planning horizons, e.g., post-POM (Program Objective Memorandum). However, JFCOM should be illuminating paths and avoid targeting specific end-dates. JFCOM is in the change business—and change is continual.

## Campaign issue selection criteria

The campaign plan should focus on a few big issues. Selection criteria should include the following:

- **Offers critical challenges or great opportunities at the operational level of war.** This does not mean that all or even most experimentation needs to be done at the operational level; rather that the experimentation should be informed by the problems and/or opportunities that exist at that level. Fostering interdependence of capabilities that the Services bring at the tactical level can have high payoff for the joint force.

- **Is beyond the capability of any one or even two Services to address effectively.**

- **Offers an already established base of activities that JFCOM can complement and supplement.** (Do not need to wait for new inventions.)
- **Provides opportunity for early impact along a path leading to substantial change.**
- **Lends itself to those learning from operational experimentation.** (Likely not the issues where technology is 80% of the solution.)
- **Issues that the Commander JFCOM feels passionately about.** The passion will be necessary to get things implemented; therefore, this may be the most important criterion.

## Some candidate "big issues"

These were suggested by the members; no attempt was made to achieve consensus.

### Addressing severe problems (actual or potential).

- **Anti-access/area-denial challenge.** Adaptive adversaries will either try to prevent U.S. force projection into their backyards or exact a heavy price for access. What are alternative concepts and capabilities, not in a generic sense but applied to specific anti-access challenges found in the Regional Combatant Commands? Concepts should not be limited to deploying force as it is known today.
- **Coalition/multi-national operations.** Laying the foundation through participation in concept development, experiments, and related activities for more nations having the capability to operate with U.S. forces in the future.

### Exploiting a great opportunity.

- **New forms of combining joint fires and maneuver.** The United States has seen the emergence of what may be possible in the Afghan and Iraq campaigns. Precision weapons, along with precision own-force position reporting, offer the potential of employing joint fires fluidly across the Joint Operations Area with minimum fratricide.

Maneuver can enable effective joint fires, and joint fires can support maneuver much more effectively.

Fire and maneuver can be used by the Joint Task Force Commander in faster and more seamless ways than ever before. Fire Support Coordination Measures can be eliminated or moved much more quickly. Service programs already underway support this new way of American warfighting, but need to be integrated to achieve it; no expensive and long-lead hardware programs are needed to realize the potential.

### Developing critical enablers for new capabilities.

- **Command and control of joint intelligence, surveillance, and reconnaissance (ISR) assets is one such critical enabler.** Issues include planning, responsiveness to commanders at all levels, dynamic allocation, and adaptive tasking. ISR will remain high-demand assets even as their densities and types increase. New approaches to command and control these assets will be needed to exploit their potential.

- **Another enabler is the capabilities of DoD agencies.** The challenge is how to further increase the contributions made during a campaign by agencies such as the Joint Warfare Analysis Center, the National Imagery and Mapping Agency, and the Defense Threat Reduction Agency. This involves reach-back, inform-forward, and an extension of what JFCOM is already working on: collaborative environment and SJFHQs.

Dealing with the anti-access/area-denial challenge and exploiting the new forms of combining joint fires and maneuver opportunity, in particular, had champions among the Task Force members. Arguments ran along the line that each has the potential to transform the way the U.S. military fights; is beyond any one Service's abilities; can draw on Service developments and build upon recent operational experience; and offers opportunities for significant advances in the near to mid-term.

# Chapter 3. How Do Results of Experiments Become Real and Useful?

Good experiments on important topics are necessary but hardly sufficient. For experimentation to serve its transformation function, the results of experimentation must motivate follow-on action. There are impediments to making this happen. The very nature of experiments, with their uncertain outcomes, does not easily fit into DoD's established resource allocation processes. Furthermore, for joint experiments, the responsibilities and authorities for taking the next steps often are not clear.

Much of the responsibility and authority for taking next steps and doing something about the results of experiments is beyond JFCOM's capacities. However, JFCOM can do much to foster implementation.

## What JFCOM should do

1. **Many of the suggestions that the Task Force has offered about an effective experimentation campaign plan will, by themselves, facilitate implementation.**

These include focusing on specific joint warfighting problems rather than more abstract concepts, increasing the number of participants in the experimentation process, moving to continuous experimentation, and becoming more involved with real world operations.

2. **In almost all cases, JFCOM can recommend next steps; in some cases, it is in a position to take action on these steps.**

What is learned from an experiment can motivate a decision to discard a concept under investigation, to pursue additional exploratory experimentation, or to transition the experiment's subject from an exploratory to a demonstration phase—i.e., prototyping. "Prototyping" here is used in a broad sense, not limited to materiel but involving any or all elements of

DOTMLPF.[1] JFCOM is already in the prototyping business with the SJFHQ. Members of the Task Force view prototyping as a natural "next phase" for concepts that show promise in exploratory experimentation rather than the parallel track as depicted to us by JFCOM.

### 3. In some cases, JFCOM, through its responsibilities other than experimentation, will be a customer of experimental results and in a position to take follow-on action.

These other responsibilities include joint training, joint urban operations, and joint deployment ownership. Getting to these next steps will require close collaboration across JFCOM directorates and not only within JFCOM's J9 (Joint Experimentation Directorate).

### 4. JFCOM should emulate its experience leading the Joint Lessons Learned activity for Operation Iraqi Freedom (OIF).

This involved putting together a coherent story of what happened, offering explanations of why (from several perspectives), identifying implications, and suggesting next steps. It also involved much personal attention from the Commander JFCOM to get the story out quickly to the highest levels in DoD (including the SecDef and Chairman, JCS), and widely (to Combatant Commands, Services, Joint Staff, the Office of the Secretary of Defense, as well as non-DoD stakeholders).

These same steps are also relevant to experiments. While lessons from real-world operations are more compelling (the real thing!), lessons from well-run experiments can be as significant particularly because experiments can explore potential responses of future adversaries.

### 5. JFCOM should select participants for experimentation who have the potential to serve as agents of change (as informed by their experiment experiences).

Implementation is not just about using prescribed processes; less formal channels can be significant. Perhaps most important is the leader development potential of exposing officers to the experimentation environment. An

[1] Doctrine, Organization, Training, Materiel, Leadership, Personnel, and Facilities.

example of this is the Army High Technology Test Bed activity during the 1980s, considered by many a failure because of the lack of materiel inserted into the force but which had deeply influenced the thinking of future army leaders.

### 6. JFCOM should embed implementation plans into the experimentation campaign plans and involve implementers in the experiment.

Think in terms of *processes* rather than *events*. Do not wait until the final report is written and released to start things moving on implementation. Examples of steps that can be taken at the experimental stage include:

- Get buy-in of objectives, topics, metrics from key decision-makers.
- Establish a robust joint integrator function within JFCOM.
- Require an implementation plan before an experiment (like the ACTDs).
- Bring in test and evaluation (T&E) earlier (painful but has the potential to be very helpful).

### 7. JFCOM should leverage the excellent connections that its own training directorate (J7, the Joint Training Directorate and Joint Warfighting Center) has developed with the other Combatant Commanders to combine experimentation with exercise support in the Tier I exercises in the Combatant Commands.

JFCOM should foster a closer relationship with the Joint Staff's J8 (Force Structure, Resources, and Assessment Directorate). Working together with the Joint Staff J8, JFCOM has a much better chance of securing the programming and budgeting changes needed for transformation.

## What the Department needs to do

### 1. DoD needs more flexible and adaptive processes for implementation than it presently has.

One size does not fit all. These processes need to be user friendly to all DOTMLPF, not just Materiel. The department-wide move toward spiral development and less specific Operational Requirements Documents (ORDs),

if implemented properly, should result in more experiments embedded in development processes (and explicitly to implementation).

### 2. There needs to be more flexibility—a "pot of funds"—to rapidly implement and pursue promising "things" that come out of joint experiments.

These "things" include changes to DOTMLPF

- that a Service can provide if directed to,
- that a Combatant Command can implement if resourced, and
- that require additional "joint" system development and integration effort

The experiment could also produce findings and raise additional questions that stimulate additional experimentation. Even a product as soft as "insight" should result in next steps that might have unexpected resource implications.

The Task Force did not attempt to specify in detail the amounts needed, although the general belief is that it would have to be hundreds of millions of dollars per year to have a significant effect. The Task Force also did not try to address where these funds should come from or resolve who should own and control them. JFCOM would influence allocation of these funds through experimentation results, but the bulk of the funds for implementation should be controlled elsewhere, in OSD or by the CJCS, for example. The Joint Requirements Oversight Council or a federation of Combatant Commanders could play important roles in deciding what to fund.

A promising area for high-leverage investments in joint warfighting is fixes to gaps in "the last joint mile" of Service operational networks. A dedicated team of system engineers rapidly could make temporary fixes to joint shortfalls; JFCOM could then leverage this work to fashion longer-term fixes.

The Task Force does not believe that it will be sufficient only to have a more disciplined front-end to the experimentation process in which proposed experiments would have to fit into an overall architectural framework derived from capstone and supporting concepts. Developing such grand architectures that are also practical will be a formidable challenge in itself. In any

event, experimentation calls for more flexibility and capability to exploit surprises.

### 3. ACTDs and joint experiments should be tied closer together.

Exploit their complementary nature. Experiments are more exploratory in nature and often involve the use of surrogate systems (either virtual or real). ACTDs involve prototypes. Experiments should spawn ACTDs as a natural step in the maturation of fielding of new capabilities.

Likewise, ACTDs can be used for experimentation. The operational-technology teams brought together for an ACTD are well suited to explore issues of a more experimental nature than those issues embedded in the basic ACTD. Thus, many ACTDs provide an opportunity to tag on an experiment at relatively modest additional cost.

# Chapter 4. Observations about MC02 Results

The Task Force addressed only the *results* of MC02 (based on short presentations to the Task Force), not its *design* or *execution*.

**Task Force members identified the following items as the strongest (based on what was learned) and most implementable of the MC02 results, in no priority order.**

### 1. Standing Joint Force Headquarters (SJFHQ)

The news from MC02 here was not about SJFHQs *per se*, but that an effective Joint HQ was rapidly created by merging a Service-centric HQ with a much smaller cadre of joint operations specialists with their equipment. The cadre was evidently able to transform the way the resultant Headquarters operated and not merely provide additional functions and services to the extant HQ. The Task Force noted that this most important message—that a relatively small joint core was rapidly able to combine with a Service-centric HQ into an effective Joint HQ—was buried in the presentation.

### 2. Training and experimentation activities were self-reinforcing

Mature (training) and immature (experimentation) activities were successfully combined despite both being in flux. Such combining becomes more practical—perhaps necessary—as training increasingly stresses adaptation. Both participants and trainers changed the way they did business based on participation in the experiment. Both the 18th Airborne Corps and 3rd Corps benefited from participation (endorsements from commanders and others). The Joint National Training Center experiment showed the value of the "center of centers" concept that incorporates distributed and integrated, live, virtual, and constructive training.

### 3. Exploited a Collaborative Information Environment

MC02 sharpened and confirmed the trend toward Service-wide horizontal collaboration. It demonstrated (1) specific tools, e.g., Joint Enroute Mission

Planning & Rehearsal System, that could eliminate lost planning and command time due to travel, and (2) the enforcement of standards is essential to exploit the power of collaboration. It also highlighted tensions between collaborative processes and the traditional chain of command.

### 4. Created a Simulation Federation

The successful federation of more than 50 simulations in a relatively short time showed the power of federations and their impressive capabilities at JFCOM. A Simulation Federation also poses as a possible alternative to Joint Simulation (JSIM). However, Task Force members were concerned that there was insufficient attention to making the federation a MC02 "leave behind" and sustaining its capabilities that had been so impressively fashioned.

### 5. Joint Fires Initiative

The Task Force members believed that the results of the Joint Fires Initiative have direct application at the Regional Combatant Commands. We also noted that these results are worthy of being given more prominence in the MC02 story.

### 6. Joint Interagency Coordinating Group (JIACG)

Comments of the Task Force members reflected the importance of getting the interagency dimension right. After some initial skepticism about the particular approach used in MC02, Task Force members saw the JIACG as a useful step. Although structural problems inhibit integration of interagency operations, a JIACG can improve a JTF Commander's military planning and execution by providing knowledgeable and experienced advisors and liaison personnel working directly with him and his staff.

## Task Force members were less persuaded by the claims about the following.

### 1. Effects-Based Operations (EBO) and Operational Net Assessment (ONA)

The Task Force members agreed that there is real substance in EBO and that there are new enablers (precision strike, ISR, systematic modeling of adver-

sary networks) of emerging EBO capabilities available to Joint Force Commanders.

However, the members were not convinced, on the basis of the presentation, that MC02 shed much new light on EBO's implementation. Members also agreed that greater collaboration and more expert advice available on the collaborative network are good things but had trouble grasping the "what" in ONA.

### 2. Force Projection

It was not made clear to us how force projection issues were addressed in MC02 and to what extent anti-access threats were played. We suggested that the findings should focus on the *force deployment process* (which was addressed in the experiment) rather than the broader *force projection issues* (as implied in the presentations to us). We also noted that a finding presented to us ("…that the Force Projection Process is broken…") was truly important but insufficiently highlighted and elaborated, or was overstated, based on what was actually learned in MC02. (Observations from Operation Iraqi Freedom indicate that there are indeed problems.) If the deployment process is broken, JFCOM has much of the responsibility (with its Joint Deployment Ownership hat) to fix it.

### 3. Information Operations

The MC02 presentation conveyed almost no information about Information Operations and gave the impression of very little learned in the experiment.

## General comments on the MC02 presentations to the Task Force.

### 1. Too many recommendations were presented—the weaker recommendations detract from the strong.

There was some attempt in the JFCOM presentation to distinguish the "ready for implementation" results from the "needs more work." But Task Force members observed that not nearly enough weight was given to the ideas that demonstrated actual performance in MC02, and too much to those based on their "conceptual potential" (as envisioned by JFCOM concept developers). The former are the big news (we suggested several earlier in this

section) while the less mature concepts (EBO, ONA) might be reinvented based on feedback and interest.

### 2. Results (what actually happened in the experiment) were not distinguished from interpretations, judgments, and opinions.

Members recognized that the results were not conclusive in any sense and must be combined with interpretations and judgments to inform the way ahead. However, a more effective telling of the MC02 story would distinguish these. JFCOM should craft a simple story of:

- what happened (the fight: good/bad/ugly),
- what Red and Blue attempted to do (or better yet where the concepts attempted to change the *status quo*),
- what JFCOM (and others) think they learned, and
- then what JFCOM plans to do about what it learned.

This logic will work with the skeptics better than the current product, which focuses on the concepts played.

# Chapter 5. Summary of Recommendations

**JFCOM should:**

1. Concentrate the JFCOM CD&E effort on a few specific warfighting capabilities. General concepts should help guide the effort, but not be its focus.

2. Reorient JFCOM CD&E effort to work more closely with the Services, Commands, and Agencies to make their experiments, exercises, and related activities much more relevant to joint warfighting issues.

3. Become an aggressive collector, analyzer, and disseminator of lessons learned and data collected in joint areas from real-world operations and exercises.

4. Use the attributes described in Chapter 2 and Appendix A as a guide to maturing the CD&E campaign. Periodic "objective" assessments could be helpful.

5. Apply its current experience in the OIF Joint Lessons Learned process to the challenge of making the results of experiments more timely, relevant, and actionable.

6. Create closer ties within JFCOM between the CD&E efforts and those in a position to take follow-on action, e.g., joint trainers, urban operations, joint deployment owners.

7. Select participants for experimentation who can serve as agents for change informed by their experience in the experimentation process.

8. Embed implementation plans into the experimentation campaign plans and involve implementers early in the experiment.

9. Leverage the excellent connections that JFCOM's J7 (Joint Training Directorate and Joint Warfighting Center) has developed with the other

Combatant Commanders to combine experimentation with exercise support in the Tier I exercises in the Combatant Commands.

10. Establish a closer relationship with Joint Staff's J8 (Force Structure, Resources, and Assessment Directorate).

### The Secretary of Defense should:

1. Give some personal attention to the joint experimentation campaign. Without such attention, progress will be difficult. The SecDef should require briefings on results. The campaign should be addressing issues of great interest to the SecDef—otherwise it is likely not transformational.

2. Provide funding flexibility to rapidly implement or pursue promising results of joint experiments.

3. Direct the Under Secretary of Defense for Acquisition, Technology, and Logistics and Commander JFCOM to devise arrangements to tie ACTDs and joint experiments closer together.

# Appendix A. Desired Attributes of an Experimentation Campaign

- **External orientation**
- **More competition**
- **More attention to tough military challenges posed by adaptive adversaries**
- **Smaller and more frequent experiments, more participants, and more flexibility in the experimentation campaign**
- **Closer connections to real-world operations**
- **Include the tactical level**
- **Emphasis on discovery experiments rather than hypotheses testing**
- **Persuasive metrics**

## External orientation

It appears to the Task Force that JFCOM's operative model has been largely to invite the Services and others to participate in its (JFCOM's) events. The Task Force suggests a different model—one that will allow JFCOM to serve more effectively as a catalyst and effect real change. JFCOM should devote more of its attention, energy and resources to *aggressive outreach*—fostering, connecting, orchestrating, integrating, and otherwise influencing the concept development and experimentation (and other learning activities that might not be called experiments) of all the Services and the Combatant Commands.

All members agreed that closer relationships with the Services and the other Commands are essential. Task Force members observed that there has been insufficient outreach from the JFCOM to the Services, and suggested more interfaces and liaisons in Service headquarters and more personal relation-

ships and exchanges with Service leadership. Close relationships between the Commander JFCOM and each of the Service Chiefs is especially important. Fostering these relations will take JFCOM resources, including that most precious resource, the time of the JFCOM Command and the time of some of its most talented people.

JFCOM has a historic opportunity to capitalize on Service and Combatant Command recognition of the need for innovation and change. Only by being intimately involved in day-to-day operations and training events can JFCOM achieve maximum impact. JFCOM must become a full partner in Service and Combatant Command activities to realize its full potential.

As a major part of this aggressive outreach, JFCOM can play an important role in addressing shortfalls in joint warfighting in the Regional Commands (and also in the Special Operations and Strategic Commands as they assume global supported command roles). The Task Force believes that JFCOM can still pursue longer-term visions as it tackles the problems and shortfalls confronting the Commands. The history of military innovation indicates that profound change in military capability is most often achieved by continuous "evolutionary" improvements guided by new concepts. Combatant Commander "ownership" of an experiment (supported by JFCOM) enhances the credibility of the results and enlarges the advocacy base for change.

JFCOM's interaction with the Commands will be facilitated by having robust JFCOM representation at these Commands. Currently, JFCOM training teams have well-established relationships with the Regional Commands, supporting two to three major exercises per year. These relationships can be the foundation for an experimentation relationship centered on regional exercise programs. Working with these Commands, JFCOM should exploit all exercises and operations to continuously improve joint warfighting capability. That way, discovery, improvement, validation, and implementation will all take place simultaneously. Training and experimentation can be self-reinforcing, particularly as adaptability increasingly becomes a training goal.

The functions that JFCOM can provide include (1) discovering and championing best practices and (2) fostering enhancement and familiarity of functional expertise in specialized areas. These are discussed briefly in the following paragraphs.

**Discovering and championing best practices.** JFCOM should have observers at all exercises and operations to gather data on how the joint warfare areas are actually being carried out, and then devise experiments to work out improvements in future exercises and operations to reach Rapid Decisive Operations. To the maximum extent possible, these experiments should be carried out within the existing exercise program, either in JFCOM or in the regional area of responsibilities. Through its continuing contact with the Combatant Commands, JFCOM should ensure that "best of breed" practices are being continuously spread.

As it learns from observation and experimentation what systems are actually working best in the joint warfare areas, JFCOM can go to JROC and OSD with data-supported recommendations for 1) joint DOTMLP changes and 2) characteristics of Service programs that are needed to be effective in joint warfare.

**Fostering enhancement and familiarity of functional expertise in specialized areas.** Chemical, biological, information warfare; network management; ISR management—these are among the areas where skills are so specialized and scarce that it is near impossible to replicate them in all the commands. JFCOM should work out procedures for functional expert teams to plug into joint task force structures quickly, and these teams should participate in regional command exercises so the real crisis is not the first time everyone meets.

## More Competition

Experiments should be conducted in an environment conducive to competition of ideas and challenges of assumptions. Competition between specific approaches to problems and opportunities both motivates innovation and facilitates assessment of experimental results. Competition of ideas is particularly important because of the intent of the Department of Defense to move towards capabilities-based rather than threat-based planning. Competition could be inimical to innovation if it becomes preoccupied with dividing

up budget pies. Staying out in the future is a way to minimize the budget brawls, but too far out makes you irrelevant.

A necessary ingredient of the desired environment is aggressive and competent Red Teams (surrogate adversaries) contesting concepts and presumed capabilities at every step of the CD&E process.

### More attention to tough military challenges posed by adaptive adversaries

Experiments are for learning—there is probably nothing more important to learn from joint warfighting experiments than how to deal with adaptive adversaries. Surprises in experiments can reduce surprises in actual operations against real adversaries. These adversaries will present challenges to both demonstrated and proposed U.S. military capabilities. Some of these challenges today include employing measures to deny or delay area access; seeking refuge in mobility, urban environments, underground, under cover or among the innocent; and threatening weapons of mass destruction. The operational goals of the Quadrennial Defense Review spell out these challenges very nicely: deny sanctuary, assure access, et cetera.

The experimental campaign should explore and evaluate alternative (competitive) approaches to meeting these and other challenges. A solid grounding of experiments towards addressing these challenges will help prevent the experimentation process from becoming too theoretical and general.

A concern the Task Force has is that attention to these challenges may be diverted by a quest for a single "one size fits all" capstone concept and that the resultant process may come across as overly linear (rather than spiral or iterative). For example, in an earlier briefing to the Task Force, a key decision was identified as "Which concept to use as the basis for experimentation?" The Task Force members support the need to provide some joint principles and context beyond Joint Vision 2020 (compared to several years ago, today there is widespread agreement on what these are) but are skeptical of the value added from a sizable effort to generate "THE joint concept." A greater return from investing the time of talented people would be the exploration of competing ways—below the capstone level—to address specific challenges as discussed above.

### Smaller and more frequent experiments, more participants, and more flexibility in the experimentation campaign

The importance of continuity of personnel within at least some of the units involved in experimentation was also raised. Without such continuity it will be very difficult to sustain the co-evolution (spiral development) of DOTMLP.

The advantages of an experimentation campaign with these attributes are many.

- Smaller experiments are more conducive to learning and discovery, particularly from concept failures. (Experiments fail only when nothing is learned.)
- Many experiments (approaching a continuous regime) allow timely follow-on exploration of experimental results.
- Increasing the number of participants doing experiments enriches the experiments and perhaps of even more importance, creates more "change agents" within the enterprise.
- The campaign should not be schedule driven but instead have sufficient flexibility to adapt rapidly to surprises, to changing priorities, and, in particular, to connect to real-world operations. Flexibility does not come for free. JFCOM will need control of the funds to make this happen.

These attributes also enable a more continuous and productive engagement with the key stakeholders and customers, rather than waiting until the end (often long after) of a large-scale experiment to provide results. Operational-level field exercises have a persuasive power beyond war games and simulations and should remain an important element in the overall campaign.

### Closer connections to real-world operations

The importance of such connections is based on three observations of the Task Force:

- Real-world operations are a rich time for military innovation. They dampen the bureaucracy, stovepipes, and traditionalism that normally impede innovation in peacetime.

- In the current security environment, the U.S. military is almost continuously involved in the planning and execution of operations.

- Too often the innovations and enhancements achieved during operations are "lost" or neglected as the organization revert to business as usual after the operation.

By focusing on the operations, JFCOM can bring the energy of real-world operations into the experimentation process; support operations by tailoring experiments to meet identified needs; and by providing a badly needed process to capture, disseminate, and act on lessons learned. As one member put it, "The vehicle for experimentation should be 'real world' warfighter requirements. Without the energy, focus, and sense of urgency that is injected by reality... it will remain business as usual."

## Include the tactical level

The Task Force understands that there may be both reluctance and resistance to getting involved in Service business, but JFCOM cannot fulfill its responsibilities unless its experiments encompass tactical-level capabilities. Many tactics are not single Service but joint—air support for maneuver, all ISR tactics, joint fires, for example. Future concepts and capabilities at the operational level of war depend on evolving joint tactical capabilities and concepts. There is room for debate about the value of pushing jointness down to the lowest possible levels. But there should be no argument, however, about the need for vigorous experimentation to discover these values and costs.

## Emphasis on discovery experiments rather than hypothesis testing

The nature of the topics of joint warfighting experiments—involving humans operating against humans under extremely stressful conditions—does not lend itself to hypothesis testing. Outcomes of such experiments do not provide "proof of a hypothesis" results. They can, however, provide powerful operational and technical insights about the robustness and applicability

of the tactics, techniques, and procedures (TTPs) as well as the technology being employed. They also provide insight in preparing and training a unit for employment of new equipment or new TTP. In these types of experiments, the major learners will be the participants—not the observers.

Furthermore, line commanders articulating and embracing the operational benefit of the evaluated equipment and TTP will have more credibility with all audiences, particularly when compared to those perceived to be the process owners. Line commanders can also become proponents of worthy advances in capability, and will insist on retaining that capability in their units.

## Persuasive metrics

JFCOM needs to develop and articulate experimentation-relevant metrics that are understandable and persuasive to various audiences (not only within DoD but to members of Congress as well). Clarity of the experimentation campaign objectives and less abstract big issues will facilitate the generation of useful and understandable metrics. Metrics are needed for both the portfolio of activities and for the individual concepts or issues being pursued. Experimentation is a knowledge-generating process, and metrics need to measure the accumulation of knowledge as a product.

# Appendix B. Terms of Reference

THE UNDER SECRETARY OF DEFENSE
3010 DEFENSE PENTAGON
WASHINGTON, DC 20301-3010

ACQUISITION,
TECHNOLOGY
AND LOGISTICS

21 OCT 2002

MEMORANDUM FOR CHAIRMAN, DEFENSE SCIENCE BOARD

SUBJECT: Terms of Reference – Defense Science Board Task Force on Joint Experimentation

You are requested to form a Defense Science Board (DSB) Task Force to examine joint experimentation programs and activities and to recommend ways to enhance the contributions of joint experimentation to transformation.

The Task Force work shall extend through several phases depending on the needs of the sponsors. In the first phase the Task Force will:

1. - Review Joint Forces Command's (JFCOM) program of joint experimentation and recommend steps to enhance its value. The examination should address the goals, process and substance of the experimentation program, including:

- Creating an environment that fosters innovation and learning;
- Collecting, analyzing, interpreting, vetting and disseminating data;
- Engaging the Services, other Commands, key US government agencies and allies;
- Developing and using models, simulations and other tools.

2. - Review the recently completed Millennium Challenge 02 to identify insights and opportunities that may not have been focused on by those closer to the activity.

Subsequent phases of the Task Force could examine other issues including how to more closely link joint experimentation to contingency operations and how to more quickly implement the results of experiments.

The Task Force should provide its initial findings on phase I within 4-6 weeks and complete phase I by 8 weeks.

The study will be co-sponsored by me as the Undersecretary of Defense (Acquisition, Technology, and Logistics), and the Commander, United States Joint Forces Command. Dr Ted Gold will serve as chairman of the Task Force. MG Dean

Cash, of JFCOM, will serve as Executive Secretary and LTC Scott Dolgoff, USA, will serve as the Defense Science Board Secretariat representative.

The Task Force will operate in accordance with the provisions of P.L. 92-463, the "Federal Advisory committee Act" and DoD Directive 5105.4, the "DoD Federal Advisory Committee Management Program." It is not anticipated that this Task Force will need to go into any "particular matters" within the meaning of section 208 of Title 18 US Code, nor will it cause any member to be placed in the position of acting as a procurement official.

E. C. Aldridge, Jr.

# Appendix C. Task Force Membership

## Task Force Members

| | |
|---|---|
| Dr. Ted Gold, Chairman | LTG John Miller, USA (Ret.) |
| ADM Dennis Blair, USN (Ret.) | Gen Michael Ryan, USAF (Ret.) |
| Dr. Paul Kaminski | GEN Peter Schoomaker, USA (Ret.) |
| Dr. Andrew Krepinevich | Gen Michael Williams, USMC (Ret.) |
| Mr. Larry Lynn | |

## Executive Secretary

| | |
|---|---|
| MG Dean Cash, USA | USJFCOM |

## DSB Representative

| | |
|---|---|
| LTC Scott Dolgoff, USA | DSB Office |

## Government Advisors

| | |
|---|---|
| Dr. John Hanley | Office of Force Transformation |
| Mr. Timothy Harp | Office of the Secretary of Defense |
| Mr. Robert Shields | Office of the Secretary of Defense |
| LTC Kevin Woods, USA | Joint Advanced Warfighting Program/Joint Staff |

## Staff

| | |
|---|---|
| Mr. Brad Smith | Strategic Analysis, Inc. |
| Ms. Stacie Smith | Strategic Analysis, Inc. |

# Appendix D. List of Briefings and Discussions

### November 25-26, 2002

| | |
|---|---|
| Standards of Conduct Briefing | Mr. Bob Stoss, Office of General Counsel |
| MC02 Results | Mr. Dave Ozolek |
| Operational Net Assessment | Col Donna Lucchese |
| Modeling and Simulation in MC02 | Mr. Tony Cherri |
| Distributed Continuous Experimentation Environment | Mr. Greg Johnson |
| Training Transformation and the Joint National Training Center | CAPT Howard Thorp, USN |

### December 2-3, 2002

| | |
|---|---|
| Joint Fires Presentation | LTC Jim Lee, USA |
| Role of J 8 Discussion | LtGen James Cartwright, USMC |
| Joint Experimentation Campaign Plan | LTC Chris Kammerman, USA |

### January 9-10, 2003

| | |
|---|---|
| Joint Interagency Control Group | Mr. Len Hawley |
| Joint Concept Development and Experimentation | MG James Dubik, USA |

### March 7, 2003

| | |
|---|---|
| Revised Campaign Plan | ADM Giambastiani, USN,<br>COL Tata, USA<br>LTC Chris Kammerman, USA |

# Appendix E. Glossary

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|---|---|
| ACTD | Advanced Concept Technology Demonstration |
| AT&L | Acquisition, Technology, and Logistics |
| CD&E | Concept Development and Experimentation |
| CJCS | Chairman, Joint Chiefs of Staff |
| DoD | Department of Defense |
| DOTMLPF | Doctrine, Organization, Training, Materiel, Leadership, & Personnel, & Facilities |
| DSB | Defense Science Board |
| DTRA | Defense Threat Reduction Agency |
| EBO | Effects-Based Operations |
| HQ | Headquarters |
| ISR | Intelligence, Surveillance, and Reconnaissance |
| J7 | Joint Forces Command's Joint Training Directorate and Joint Warfighting Center |
| J8 | Joint Staff's Force Structure, Resources, and Assessment Directorate |
| J9 | Joint Forces Command's Joint Experimentation Directorate |
| JEMPRS | Joint Enroute Mission Planning & Rehearsal System |
| JFCOM | Joint Forces Command |
| JFHQ | Joint Forces Headquarters |
| JIACG | Joint Interagency Coordination Group |
| JOA | Joint Operations Area |
| JROC | Joint Requirements Oversight Council |
| JSIM | Joint Warfighter Simulation |
| JTF | Joint Task Force |
| JWAC | Joint Warfare Analysis Center |
| MC02 | Millennium Challenge 02 |
| NIMA | National Imagery and Mapping Agency |

| | |
|---|---|
| OIF | Operation Iraqi Freedom |
| ONA | Operational Net Assessment |
| ORD | Operational Requirements Document |
| OSD | Office of the Secretary of Defense |
| SecDef | Secretary of Defense |
| SJFHQ | Standing Joint Force Headquarters |
| T&E | Test and Evaluation |
| TTP | Tactics, Techniques, and Procedures |
| USD | Under Secretary of Defense |